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Applicant:	Adam J. Ferrari et al.	Confirmation No.:	4504
Application No.:	09/961,131	Art Unit:	2162
Filed:	September 21, 2001	Examiner:	C. Y. T. Truong
Title:	SCALABLE HIERARCHICAL DATA-DRIVEN NAVIGATION SYSTEM AND METHOD FOR INFORMATION RETRIEVAL		

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT (IDS)

Dear Sir:

This Supplemental Information Disclosure Statement is being filed after the mailing date of the first Office Action on the merits and before the mailing date of a final Office Action or a Notice of Allowance.

For the Examiner's convenience, Applicants submit the attached listing of the non-patent references previously submitted in this application along with a brief description of each.

Applicants believe that no fee is due with this response, because all of the references discussed in the attached summary are already of record in this application. However, should a fee be required, the Commissioner is authorized to debit any such fee or credit any overpayment relating the above-identified application to Deposit Account No. 08-0219, Order No. 109878.124-US1.

Respectfully submitted,

Dated: August 21, 2008

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Non-Patent Literature Citation	Brief Description
AGOSTI, M., et al. "Issues of Data Modelling in Information Retrieval" Electronic Publishing, (1991), Vol. 4(4) pp. 219-237	Proposes a information retrieval model which supports an auxiliary data structure referencing data elements and the semantic relationships among those elements. User interactions include navigation through the document collection by means of a structure built up of nodes and links, augmented
ALLEN, R.B., "Retrieval From Facet Spaces" Electronic Publishing (1995), Vol. 8(2&3), pp. 247-257	Describes an interface used for accessing document records organized by faceted classifications. Individual facets may be selected and hierarchal refinement performed independently,
ALLEN, R.B., "Two Digital Library Interfaces That Exploit Hierarchical Structure" Electronic Publishing (1995) 8 pages	Presents two library classification systems, one for Dewey Decimal System and the other for ACM Computing Reviews. An interface allows the user to browse book records using a
AMATO, et al., "Region proximity in metric spaces and its use for approximate similarity search", ACM Trans. In. System, (2003), Vol.	Presents an efficient and effective method to compute the proximity of metric ball regions in multidimensional spaces, with linearly computational complexity and low storage overhead.
BAEZA-YATES, et al., "New Approaches to Information Management: Attribute-Centric Data Systems" Proceedings Seventh	Introduces Attribute-Value System, a networked storage system where objects are composed solely of Attribute-Value pairs. Relationships within AVS are dynamic rather than being
BEAUDOIN et al., "Cheops: A Compact Explorer For Complex Hierarchies", IEEE, pp 87-92 (1996)	Describes a graphical representation method for the display and manipulation of logical hierarchies, in particular huge, complex informational hierarchies such as the Dewey Decimal System.
BERGSTROM, "A family of delphi components for case-based reasoning", Proceedings 11th	Presents a family of Delphi components that implement a Nearest Neighbor approach to case-based reasoning problems,
BEYER et al., "When is 'Nearest Neighbor' meaningful", Proceedings of the 7th International Conference on Database Theory",	Explores the impact of higher dimensionality on the "Nearest Neighbor" problem, showing that as dimensionality increases, the distance to the nearest data point approaches the distance
BIRD et al., "Content-Driven Navigation of Large Databases", The Institution of Electrical Engineers, 1996, pgs. 13/1 - 13/5	Discusses use of Query-by-Image-Content extensions to conventional techniques for searching large image databases. By augmenting traditional text-only indexing, it increases the
CAREY, M. et al., "Info Navigator: A Visualization Tool for Document Searching and Browsing", Proceedings International Conference Distributed Multimedia Systems",	Presents a text document search engine with several visualization front ends that aid navigation through the set of results returned by a query. The methods are based on identifying and selecting keywords on the fly, obtaining a sparse
CHEN et al., "Internet Browsing and Searching: User Evaluations of Category Map and Concept	Catalog entry, including abstract and index terms, for the following paper.
Chen et al., "Internet Browsing and Searching: User Evaluations of Category Map and Concept Space Techniques," Journal of the American	User evaluation of two approaches proposed to improve Internet information access; a Kohonen algorithm category map for browsing, and an automatically generated concept space
Chen et al., "Object Signatures For Supporting Efficient Navigation In Object-Oriented Databases", Proceeding of the 32nd Hawaii	Describes use of hashed signatures in generalization hierarchies, to optimize navigation by quickly eliminating objects that do not satisfy the predicates or belong to the target class.
CHEN et al., "Online Query Refinement on Information Retrieval Systems"" A Process Model of Searcher/System Interactions", MID	Reports findings of empirical research that investigated informational searcher's online query refinement processes. A semantic network representation is proposed to capture the
CILIBRASI, R. et al., "Automatic Meaning Discovery Using Google", 31 pages, www.bsik-	A method is shown to automatically extract the meaning of words and phrases from the World-wide-Web using Google
DIAMANTINI et al., "A conceptual indexing method for content-based retrieval", Database and Expert Systems Applications. Proceedings Tenth Workshop on Florence Italy, (1999), pp.	An indexing method is presented based on the partitioning of the data space. Binary counterparts of the notions of minimum volume and minimum overlap are combined to define a global hierarchal clustering criterion. The indexing method is also

ELLIS, GP et al., "HIBROWSE for Hotels: bridging the gap between user and system views of a database", extracts from a paper giving an overview of the HIBROWSE for Hotels	A new database interface model is presented which provides a domain oriented view of the database, with user access manipulating the database contents, rather than its structure. The underlying presentation model relies on presentation of lists of raw, summary, or related results in windows. The user may
FUA et al., "Structure-Based Brushes: A Mechanism For Navigating Hierarchically Organized Data and Information Spaces", IEEE	Presents a new technique for navigating hierarchies, called structure-based brushing, in which it is possible to select a subset of a hierarchy and explore the selected space in varying degrees of detail using drill-up and drill-down operations
GARCIA-MOLINA et al., "The Query Compiler" Database System Implementation, 2000,	Textbook chapter on SQL query processing, describing language syntax and parsing, expression interpretation, and
GIL et al., "A Visual Interface and Navigator for the P/FDM Object Database", Department of Computing Science, University of Aberdeen, IEEE, pp. 54-63 (1999)	Describes a visual interface for an object database which allows user to construct queries by clicking on entity classes and relationships in a schema diagram, and constraining the values of attributes selected from menus. Results satisfying the query are displayed as a table in a separate window, and values from
GUHA et al., "ROCK: A robust clustering algorithm for categorical attributes", Data Engineering Proceedings 15th International Conference on Sidney, (1999), pp. 512-521	After demonstrating that distances between points are not appropriate for clustering Boolean and cartegorial attributes, a solution is presented based on similarity/proximity between a pair of data points. From this, a robust hierarchal clustering algorithm is produced, which uses links rather than distances
GUTTMAN, "R-Trees: A dynamic index structure for spatial searching", Proceedings of the ACM SIG-MOD Conference, (1984)	The R-tree is a dynamic height-balanced tree similar to a B-tree with index records in leaf nodes containing pointers to data objects. It is particularly useful for indexing representations of data objects of non-zero size in multidimensional spaces, and
HAN et al., "Join Index Hierarchy: An Indexing Structure For Efficient Navigation In Object-Oriented Databases", IEEE Transactions on Knowledge and Data Engineering, Vol. 11, No. 2, pp. 321-337, March/April 1999	A Join Indexing Hierarchy structure is proposed to handle the "gotos on disk" problem in object-oriented query processing. The method constructs a hierarchy of join indices and transforms a series of pointer chasing operations into a simple search into an appropriate join index file. The method supports
HAN-JOON, K. et al., "An effective document clustering method using user-adaptable distance metrics.", SAC, (2002), pp. 16-20	This paper presents a new type of supervised clustering to organize information in a way that reflects knowledge presented by the user. A quadratic form distance metric is employed that contains a weight matrix. A variant of the gradient descent
HEARST's Fall 1999 Course, SIMS 202 Information Organization and Retrieval:	[Presentation slides] HiBrowse problem: search not integrated with browsing of categories, only see subset of categories of
HEARST, M. "Chapter 10: User Interfaces and Visualization", Modern Information Retrieval, Yates and Ribeiro-Neto (1999) pp. 257-340	Textbook chapter on user interfaces and information visualization, discussing methods of communication between information seekers and information retrieval systems. Document search and browsing interfaces are discussed, as are methods of displaying results including Kohonen feature maps and document clusters. Graphical interfaces for query
HEARST, M. et al., "Integrating Browsing & Search Relevance Feedback", SIMS 202, UC	[Presentation slides] HiBrowse problem: search not integrated with browsing of categories, only see subset of categories of
HEARST, M. et al., "Using MetaData in Search: Combining Browsing and Search", 39 slides,	[Presentation slides] Presents limitations of search and category browsing alone, several approaches to integration
HEARST, M., et al. "Cat-a Cone: An Interactive Interface for Specifying Searches and Viewing Retrieval Results Using A Large Category Hierarchy" Ann. Int. ACM-SIGIR Conf. On Res.	A novel user interface is introduced that integrates search and browsing of very large category hierarchies with their associated text collections. A key component is the simultaneous display of the multiple selected category representations, their

HINNEBURG et al., "What is the nearest neighbor in high dimensional spaces", Proceedings of the 26th VLDB Conference, (2000)	Presents a new approach to nearest neighbor search in high-dimensional space, which does not treat all dimensions equally, instead using a quality criterion to select relevant dimensions (a projection,) with respect to a given query. An example of such a
HONGYAN JING, "Information retrieval based on context distance and morphology", Proceedings of the 22nd annual international	Presents an approach to information retrieval based on an integration of two metrics; closeness of word meaning and word similarity.
http://www.searchtools.com/tools/endeca.html, Search Tools Product Report, "Endeca Faceted	Product summary of Endeca Technologies search and navigation software.
HUA et al., "Object Skeletons: An Efficient Navigation Structure for Object-Oriented Database Systems", IEEE, pp. 508-517 (1994)	Networks of unique object identifiers (object skeletons) are proposed as a navigational structure to aid query processing of complex objects. Once a skeleton is loaded into memory, navigation along the complex object can be done with no further disk access. As the descriptive information of an object is
KUMMAMURU et al., "A Hierarchical Monothetic Document Clustering Algorithm for	An algorithm for hierarchical monothetic results clustering is presented which progressively identifies topics in a way that
MCENEANEY, John E., "Visualizing and Assessing Navigation in Hypertext", Hypertext 99, Darmstadt Germany, pp. 61-70 (1999)	Methods are proposed for a more direct representation and analysis of user movement in hypertext, allowing empirical exploration of the relationship of the resulting measures to performance in hypertext search tasks. Based on analysis of hypertext distance and path matrices, the path metrics path compactness and path stratum are defined. Analysis of user
MILLER et al., "DataWeb: Customizable Database Publishing for the Web" IEEE Multimedia, 4(4):14-21(1997)	DataWeb provides an intelligent query facility that builds on hypertext-style web applications and decision support systems, to allow users to locate data of interest. The test-bed is operational, and provides access to the Greek National Tourist
MILLER et al., "Integrating Hierarchical Navigation and Querying: A User Customizable Solution" ACM Multimedia Workshop on Effective Abstractions in Multimedia Layout,	An integrated form of querying and hierarchal navigation is proposed, similar to the methods used by data analysis systems to "drill down" on statistical data. The data visualization is interactive, allowing an initially imprecise query to be refined
MILLER, Renee J., "Using Schematically Heterogeneous Structures", Department of Computer and Information Science, Ohio State University, 1998, pg. 189-200	Schematic heterogeneity arises when information that is represented as data in one schema, is represented as metadata in another schema. Traditional query languages and view mechanisms are insufficient for reconciling and translating data between schematically heterogeneous schemas. We consider how higher order query languages may be used to
MILLS, J., "The Problem of arrangement in a Library", A Modern Outline of Library Classification", Chapman & Hall Ltd, pp. 1-8, 1960	An overview, based on a series of lectures on Library cataloging and classification, discussing historical methods of subject-based classification. In particular, raises limitations of legacy solutions, including difficulties handling synonyms and related materials, and inadequacy of presenting complex subject matter
PEDERSEN, G.S., "A Browser For Bibliographic Information Retrieval Based On An Application of Lattice Theory" Proc. Of the Ann. Int. SCM SIGIR Conference on Res. And Deve. In Information Retrieval, (1993), pp. 270-279	An interface to bibliographic databases is presented which allows non-expert information searchers to operate within a world of concepts, authors, and document records and their relationships. The presented set of relationships lattice diagrams represents a formalization of many information retrieval concepts. Separate display window panes display and

PI-SHENG, "Using case-based reasoning for decision support", Proceedings of the 27th Annual Hawaii International Conference on System Sciences, (1994), pp. 552-561	This paper proposes a computational case-based reasoning model to be applied to problem solving and decision making in complex and dynamically changing situations. As the model requires training, it is less applicable to applications where data collection is difficult, or where a set of historical data along with the results of evaluation are not available for the induction of
Pollitt A.S., "Intelligent Interfaces to online Databases", Expert Systems for Information Management, Vol. 3, No. 1, pp. 49-69, 1990	Historical review of the need for and development of intelligent interfaces and examines what makes an interface intelligent. Three prototype interfaces are discussed: CANSEARCH, EP-X, and MenUSE. The conclusion suggests that the most
POLLITT et al., "Faceted-Classification as Pre-Coordinated Subject Indexing: Multi-Dimensional Searching for OPAC Users", Oslo College, 6-7 May 1998	Presentation slides - current methods focus on search within fixed categories (keyword, phrase). Parsing Dewey Decimal classification yields a distinct set of hierarchal structured categories. However, it is necessary to build or synthesize numbers to combine concepts. Computer database products use hierarchic or network models to represent data structure and the way it was physically stored. To access different e.g.
POLLITT et al., "MenUse for Medicine: End-User Browsing and Searching of MEDLINE via the MeSH Thesaurus", Int. Forum Inf. and	MenUSE is an advanced intermediary system for end-user searching of bibliographic databases. An improvement on CANSEARCH, it supports both increased scope and
POLLITT et al., "MenUse for Medicine: End-User Browsing and Searching of MEDLINE via the MeSH Thesaurus", Int. Forum Inf. and Docum., Vol. 13, No. 4, pp. 11-17, October	MenUSE is an advanced intermediary system for end-user searching of bibliographic databases. An improvement on CANSEARCH, it supports both increased scope and functionality, including a simplified user interface. It was
POLLITT et al., "Multilingual access to document databases", CAIS/ACSI '93 Information as a Global Commodity - Communication, Processing and Use,	This paper examines the reasons why approaches to facilitate document retrieval which apply Expert Systems techniques and rely on so-called "natural language" query statements from the end-user result in sub-optimal solutions. It does so by reflecting
POLLITT, A. S. et al., "View-based searching systems - a new paradigm for information retrieval based on faceted classification and indexing using mutually constraining knowledge-based views", The Interface Design, 6 pages	View-based searching techniques employed in prototype HIBROWSE interfaces employ a faceted classification model, projecting a view onto databases using navigable hierarchies of subject descriptors from thesauri and grouped attribute values. Views inform the user of the number of documents resulting from inclusive searching of descriptors or attribute values and are mutually constraining. Each additional view provides an explicit constraint mechanism to modify the numbers of
POLLITT, A.S., "A rule-based system as an intermediary for searching cancer therapy literature on MEDLINE", Intelligent Information Systems: Progress and Prospects, pp. 82-126, 1986	This research investigated the possibility of computer searching carried out directly by the user; the contention is that computerized searching will not have their full impact unless direct user access is common, without the specialized knowledge currently required for such access. In the described system, a processing system is interposed between the user
POLLITT, A.S., "An Expert Systems Approach to Document Retrieval, A thesis submitted to the Council for National Academic Awards in partial fulfillment of the requirements for the degree Doctor of Philosophy", May 1986	A computerized intermediary system is proposed to facilitate online document retrieval from large scale databases directly by users of the retrieved information, without requiring user training or particular knowledge of the underlying retrieval system. The rule-based system generates search statements for the underlying databases. The underlying rules, grouped into

POLLITT, A.S., "Expert Systems and the Information Intermediary: Tackling Some of the Problems of Naive End-User Search Specification and Formulation", Intelligent Information Systems for the Information	An expert systems approach has been taken in the development of a program called CANSEARCH. This program provides search specification and statement formulation for naïve users wanting to search the MEDLINE database. The program provides an intermediary or access system, using
POLLITT, A.S., "Information Storage and Retrieval Systems, Origin, Development and Applications, Ellis Horwood Books in	Textbook. Areas of coverage include database structure and interfaces, data organization, viewdata, hypermedia and other presentation methods, and use of intermediary or front-end
POLLITT, A.S., "Reducing complexity by rejecting the consultation model as a basis for the design of expert systems", Expert Systems, Vol. 3, No. 4, pp. 234-238, October 1986	Assessment of the MYCIN expert system program. MYCIN was never deployed in a clinical setting, due to know logistical and human-interface issues, in particular its inability to access information already stored in other computer systems within the same facility. Thus, further development of such systems must also incorporate consideration of data capture strategies, not
POLLITT, A.S., "Taking a different view", British Library research, Library Technology, Vol. 1, Nov. 1, 1996	Article describing application of HIBROWSE interface technology to the Embase biomedical database. The key design feature of HIBROWSE is that the interface presents views of a database by aggregating available attribute (or facet) values. These views can be progressively refined by browsing, or by
POLLITT, A.S., "The key role of classification and indexing in view-based searching", Centre for Database Access Research, University of	HIBROWSE for EMBASE utilizes a faceted classification approach to information retrieval. It does this by employing a point and click user interface with mutually constraining views
POLLITT, et al. "HIBROWSE For Bibliographic Databases" Journal of Information Science, (1994), Vol. 20 (6), pp. 413-426	The HIBROWSE design offers improved searching functionality for users of bibliographic databases. The interface provides a multi-windowed view of data stored on a relational data management system, using layered attribute value aggregation and classification. The user interrogates the database by
POLLITT, et al. "View-Based Searching Systems - Progress Towards Effective Disintermediation" Online Information Meeting Proceedings, (1996) pp. 433-445	This paper presents the background and development results for two view-based searching systems. The HIBROWSE approach to searching provides significantly more effective information retrieval for end-users than is possible using a simple keyword, command line, forms-based or hypertext linking interaction. View-based searching makes extensive use
POLLITT, Example from EMBASE entitled "Screen Shots from View-based searching with HIBROWSE", (1998)	Screen shots showing separate windows for each facet or attribute value hierarchy, selection of elements within windows for refinement/modification, automatic refresh of all windows as
POLLITT, excerpt from "Prospects for using Dewey Classification in a View-based Searching OPAC Dewey Decimel Classification: Possibilities in View-based Searching OPAC", (1998)	Presentation slides - current methods focus on search within fixed categories (keyword, phrase). Parsing Dewey Decimal classification yields a distinct set of hierarchal structured categories. However, it is necessary to build or synthesize numbers to combine concepts. Ideally a fully faceted
POLLITT, S., "CanSearch: An Expert Systems Approach to Document Retrieval", Information Processing & Management, Vol. 23, No. 2, pp. 119-138, (1987)	A computerized intermediary system is used to facilitate online document retrieval from large-scale searchable databases, directly by users of the retrieved information. The scope for a novel intermediary system relating to recent developments in expert systems has been identified, and a system called
PriceSCAN.com, Your Unbiased Guide to the Lowest Price on Books, Computers, Electronic,Copyright 1997-1999,	Screen shots of the PriceSCAN web site as of June 14, 2004. Shows selection of product category and hierarchy of products within that category, displayed using HTML links. Also shows

PRISS, U. et al., "Utilizing Faceted Structures for Information Systems Design", School of Library and Information Science, Indiana University Bloomington, pp. 1-12	This paper argues that a faceted thesaurus represents a desirable model for a small-scale institutional website. The faceted approach can make the process of organization less random and more manageable. The study underscores the
RAMASWAMI et al., "Navigating a Protection-Engineering Data Base", IEEE, pp. 27-32, April 1989	The article focuses on the features of a relational database and database editor, as components of a larger computer-aided protection engineering system. As is common, the relational database model is based on tables of records, each uniquely identified by primary key fields, with tables structured into larger virtual tables called "views". The database editor supports
SALTON et al., "Term-weighting approaches in automatic test retrieval", Information Processing & Management, (1988), Vol. 24(5), pp. 513-523	Experimental evidence indicates that text indexing systems based on the assignment of appropriately weighted single terms produce retrieval results that are superior to those obtained with more elaborate text representations. However, these results
Screenshots from "View-based searching with HIBROWSE", http://www.jbi.hio.no/bibin/kurs/korg98/oslo2.ppt	Screen shots showing separate windows for each facet or attribute value hierarchy, selection of elements within windows for refinement/modification, automatic refresh of all windows as
SHAMOS et al., "Closest-point problems", Proceedings of the 16th Annual Symposium on Foundations of Computer Science, IEEE (1975)	A number of problems involving proximity of N points in the plane are studied, such as finding the Euclidean minimum spanning tree, smallest circle enclosing the set, k nearest and farthest neighbors, two closest points, and straight-line triangulation. For most problems a lower complexity bound if O(N log N) is shown. For all, an upper complexity bound is O(N^2) or worse. A single geometric structure called the Voroni
STORY, G.A., et al., "The RightPages Image-Based Electronic Library for Alerting and Browsing" Computer, (1992), Vol. 25(9), pp. 17-25	The RightPages system provides a user interface which alerts users of the arrival of new journal articles, lets them examine images of pages in those articles, and enables them to order paper copies of any article in the database. As incoming documents may be presented in either text or image form, an integrated OCR application is provided to create searchable and
TREGLOWN, M. et al., "HIBROWSE for Bibliographic Databases: A study of the application of usability techniques in view-based	Project review of the HIBROWSE program, focusing on the application of methods and techniques from human-computer interaction design in the development, construction, and
TU et al., "Agent Technology for Website Browsing and Navigation", Proceedings of the 32nd Hawaii International Conference on Systems Sciences", IEEE , pp. 1-10, 1999	This paper discusses the issue of website browsing and navigation, that is, traversing within the confines of a website and collecting information. The investigation includes discussion how a website browsing agent may utilize user
TURINE et al., "A Navigation-Oriented Hypertext Model Based on Statecharts", Hypertext 97, Southampton UK, 1997	A navigation-oriented model for hyperdocument specification is proposed, based on statecharts. This extension to HTML uses the structure and execution semantics of statecharts to specify the structural organization and the browsing semantics of the hypertext documents. This new model is particularly suitable for formally structured documents that present a hierarchal structure such as books, scientific papers, online manuals and
VELEZ et al., "Fast and Effective Query Refinement", SIGIR 1997, pgs. 6-15	Query Refinement is the interactive recommendation of new terms related to a particular query, which may more accurately reflect the user's information need. This study describes experimental measures and methods used to assess the quality of suggested query refinements. It also introduces RMAP, a fast

Weiland et al., "A graphical query interface based on aggregation/generalization hierarchies," Information systems, Vol. 18, No.4, pp. 215-232 (1993)	A method of organizing documents based on the concepts of aggregation and generalization hierarchies is proposed. A graphical user interface is provided which supports a more intuitive form of Boolean query, based on mapping the nodes of the aggregation hierarchy to Boolean intersection operations,
XIONG et al., "Taper: A Two-Step Approach for All-Strong-Pairs Correlation Query in Large Databases", IEEE Transactions on Knowledge and Data Engineering, Vol. 18, No. 4, April 2006, pgs. 493-508	Given a user-specified minimum correlation threshold, an all-strong-pairs correlation query finds all item pairs with above-threshold correlation. However, when the number of items and transactions are large, the computational cost of this operation can be very high. A more efficient two-step algorithm is
Yahoo 1996 (Exhibit 12-16)	Reference screen shots of the Yahoo! website browsing and
Yahoo!, Copyright 1999 Yahoo! Inc., <http://web.archive.org/web/19991116151216/h	Reference screen shots of the Yahoo! website browsing and searching interfaces, from the Internet Archive, circa 1999,
YOO et al., "Towards A Relationship Navigation Analysis", Proceedings of the 32nd Hawaii International Conference on System Sciences",	Relational Navigation Analysis provides a systemic way of identifying useful relationships in application domains, using a generic relationship taxonomy. Once so identified, relationships